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April 15, 1992

Mr. Arturo Duran
U.S. Environmental Protection Agency
999 18th Street
Denver, Colorado 80202

RE: Annual Report for Treatability Studies at Rocky Flats Plant
Fiscal Year 1991
Work Assignment Number C08061, Contract Number 68-W9-0009 (TES 12)

Dear Mr. Duran:

PRC Environmental Management, Inc. (PRC) reviewed the annual report for treatability studies at Rocky Flats Plant (RFP) for fiscal year 1991 under work assignment number C08061, Technical Enforcement Support (TES) 12, from the U.S. Environmental Protection Agency (EPA). This work assignment requires PRC to provide technical oversight and document reviews for areawide remedial investigation/feasibility study (RI/FS) activities at RFP in Golden, Colorado.

At the request of EPA, PRC also reviewed the 1992 work plan for technical adequacy and compliance with the RFP Final Treatability Studies Plan dated June 3, 1991. In addition, the annual report and the accompanying appendices were compared with the Final Comment/Resolution Summary of EPA Comments on Final Treatability Studies Plan (DOE, 1992).

In general, the annual report was technically adequate. However, the organization of the document is confusing. Some of the comments made on the TSP have been addressed in the annual report. Inconsistencies and inaccurate internal references throughout the report affect its clarity and utility. These are identified in the following general and specific comments.

GENERAL COMMENTS

1. There are inconsistencies throughout the annual report between the information presented in tables and appendices. References to technologies in the text, tables, and appendices should be consistent. The technology data sheets included in Appendices B and C should include all the technologies listed in the tables. The statements of work (SOWs) included in Appendix D

should include an SOW for each technology that has been selected as a sitewide bench- or pilot-scale treatability study. Missing SOWs should be added to the document.

2. The names used to refer to specific technologies in different parts of the document are not consistent. For example, "aerobic biodegradation" is listed in Tables 4-13 and 4-2B, while "aerobic biological reactor" is used in the technology data sheet (page C-1 in Appendix C). Names used to refer to various technologies should be consistent throughout the document to promote clarity.

3. Final Comment/Resolution Summary of EPA Comments on the Final TSP (DOE, 1992) states that some comments made on the final TSP will be addressed in the annual report. However, the annual report does not address all comments. For example, comments on the August 28, 1991 TSP suggested the management decision factor be described in further detail. The response to the comment is that "a more complete discussion will be provided in the annual report" (DOE, 1992). However, the "management decision factor" is not mentioned in the annual report. It is unclear why the management decision factor is omitted from the screening process in the annual report. The annual report should provide all information requested in the comments, to explain the unclear information presented in the TSP.

4. One of the criteria for final screening of treatment technologies is whether the technology offers advantages over other available technologies. Tables 4-5A and 4-6B include columns for these criteria which list "yes" or "no" responses. It is unclear what the advantages or disadvantages are. In addition, it is difficult to draw conclusions based on the information presented in the document. For example, no advantages can be observed from the information presented in Table 4-2B and technology data sheets for slurry phase bioreactors compared to the other technologies with the same functions listed in Table 4-2B. The only exception is implementability, which is not one of the significant advantages stated in paragraph 2, Section 4.1.4 (page 4-4). The documentation on the selection process should be more comprehensive, especially for the final screening process. In addition, the advantages

of a selected technology in comparison to other technologies which perform a similar function should be explained in more detail in the text or in the representative tables.

SPECIFIC COMMENTS

Comment 1. Pages 3-1 through 3-3, Sections 3.1 and 3.2. These sections describe the ongoing bench- and pilot-scale tests conducted at the specific operable units (OUs), including the bench-scale test for the technology selected for use in the U.S. EPA Superfund Innovative Technology Evaluation (SITE) demonstration at RFP. The text does not indicate whether these technologies are part of the sitewide treatability studies. The comments on August 26, 1991 final TSP suggest that the relationship between the current treatability studies and the sitewide treatability studies program should be described. The response to this comment indicates that the annual report will review the interrelation between the SITE demonstration test, the ongoing OU-specific studies, and the sitewide program (DOE, 1992). The annual report should provide this information.

Rationale: The annual report should include all necessary information requested in the TSP. In addition, the annual report should describe the relationship between the treatability studies currently being conducted at specific OUs at RFP and the sitewide treatability study program to clearly understand the work being done and to be conducted at RFP.

Comment 2. Sheet 3 of Table 2-2 and Sheet 5 of Table 2-3. Table 2-2 lists the chemical compounds aldrin, alpha-BHC, alpha-chlordane, atrazine, beta-BHC, 4,4-DDT and aroclor-1254 under the semivolatiles category, while Table 2-3 lists aroclor-1254 under the polychlorinated biphenals (PCBs) category. In general, these chemicals should be listed under the Pesticides/PCBs category.

Rationale: Chemical compounds should be correctly listed and the information presented in different tables should be consistent.

Comment 3: Sheet 1 of Table 4-2B. Sheet 1 of this table lists the biological technologies to treat PCB-contaminated soil. The name "aerobic biodegration" listed in this table is not consistent with the name used for the same technology in the technology data sheet (Appendix C), where the name "aerobic biological reactor" is used. The name used for the same technology in different parts of the document should be consistent.

Rationale: Consistency between appendices and tables contributes to the clarity of the document.

Comment 4: Sheets 10 through 12 of Table 4-2B. The headings of these sheets list the contaminant groups as metals; they should be radionuclides. The headings of these pages should be corrected.

Rationale: The information should be correctly and accurately presented to contribute to the clarity of the document.

Comment 5: Table 4-4B. This table explains why the soil and sediment technologies did not pass preliminary screening. According to the table, in-situ vitrification was rejected because it is "currently not available and withdrawing from the market by vendor due to operational problems," while the technology data sheet for in-situ vitrification (page C-20) states that "the technology is commercially available." The information presented in tables and appendices should be accurate and consistent. A recent article (Geosafe Corporation, 1992) indicates that EPA still considers using in-situ vitrification at many sites.

Rationale: The information should be correctly and consistently presented. The rationale for excluding a technology from sitewide treatability studies should be logical.

Comment 6: Tables 4-5A and 4-5B. These tables list the final screening for contaminated ground water, surface water, soil, and sediment technologies. The annual report presents the following Final Screening Criteria for potential treatability study technologies: (1) that one technology offers advantages over other available technologies, (2) that the study can be conducted at bench- or pilot-scale, and (3) that no problems are anticipated for EPA, state, or community acceptance. Neither tables nor text explains why some technologies that meet the final screening criteria are rejected, such as in-situ air stripping for treating ground-water contamination with volatile organics. Detailed rationale should be provided in the text or tables for rejecting the technologies that meet the final screening criteria.

Rationale: The purpose of final screening is to eliminate technologies that do not meet the screening criteria for sitewide treatability studies. All technologies that meet the screening criteria should be considered for treatability studies; otherwise, detailed explanations for rejection should be clearly provided.

Comment 7: Tables 4-5B and 4-7. The tables indicate that the slurry phase bioreactor has been selected for a pilot-scale treatability study at RFP. The rationale for this selection is unclear. The reasons for eliminating aerobic biodegradation, the anaerobic biological activated carbon process, and anaerobic dechlorination from consideration for sitewide treatability studies are listed in Table 4-4B. The table states state that these technologies show a low or unknown potential to meet cleanup goals and that they are in the early development stage or not sufficiently developed to reliably treat PCBs. These disadvantages are also associated with the slurry phase bioreactor technology. The information presented in the annual report presents obvious advantages of the slurry phase bioreactor technology over other technologies with

similar functions, except that it uses conventional equipment. This factor is not one of the significant advantages stated in the second paragraph of section 4.1.4 (page 4-4). Table 4-5B also indicates that the slurry phase bioreactor offers advantages over other available technologies, but it is unclear from this table what the specific advantages are. A detailed rationale for selecting slurry phase bioreactor as a pilot-scale treatability study should be provided.

Rationale: Comprehensive documentation on the treatment technology selection process for the sitewide treatability study is necessary. A detailed rationale should be provided for selecting or rejecting a technology in the final screening process. In particular, explanations should be included for selecting a technology with no obvious advantages over other technologies with similar characteristics, or for rejecting a technology that meets the final screening criteria.

Comment 8: Table 4-6A. The table lists the ground-water and surface water treatment technologies selected for bench- or laboratory- scale treatability studies. It is not clear what technologies in the list will be tested at the bench-scale, and what other technologies will be tested at the laboratory-scale. The table should specify the level of treatability study to be conducted for each listed technology. The table should also list the Appendix B page number for the technology data sheet. Most of the page numbers listed are incorrect. For example, the table lists the page number for the technology data sheets for "ozonation," "peroxide oxidation," "ultraviolet oxidation," and "ultraviolet photolysis" as B-63 in Appendix B, while page B-63 is the technology data sheet for "wet air oxidation." The internal references should be corrected.

Rationale: Detailed information should be provided and accurate internal references included to contribute to the clarity and utility of the document.

Comment 9: Table 4-7. This table lists the treatment technologies selected for pilot-scale treatability testing under the "soil/sediments treatment technology." According to the final screening process listed in tables 4-5A and 4-5B, the slurry phase bioreactor is the only technology selected for a pilot-scale treatability study at RFP to treat PCB-contaminated soil, while ozonation and ultraviolet photolysis are selected for ground-water and surface water treatability studies. Therefore, these two technologies should be listed under "ground water/surface water treatment technology." The information should be accurately presented in the documents.

Similar to table 4-6A, some page numbers listed for technology data sheet are incorrect. The table lists the technology data sheet for ultraviolet photolysis as page B-59, although page B-59 describes UV/chemical oxidation. The internal reference should be corrected.

Rationale: Accurate information and internal references will contribute to the clarity and utility of the document.

Comment 10: Appendix B. The technology data sheets in Appendix B do not include the information for ultraviolet photolysis. Appendix B should include the technology data sheets for all the technologies for ground water and surface water reviewed in the annual report. In particular, technology data sheets should be included for the technologies selected for sitewide treatability studies.

Rationale: Technology data sheets provide detailed information, and it is necessary to include the technology data sheets in the appendices.

Comment 11: Appendix D. This appendix includes the SOWs for technologies selected for treatability studies. Eighteen alternatives (various technologies versus various scales of testing) are selected for the sitewide treatability studies at RFP (Tables 4-6A, 4-

6B and 4-7). However, only five SOWs are included in Appendix D. Appendix D should include the SOW for each selected alternative.

The SOWs do not include explanations of monitoring treatability tests or analysis of samples collected. Comments on the August 26, 1991 final TSP suggested that general instructions for the requirements for monitoring and analytical considerations should be presented in the SOWs. However, none of this information was added to the SOWs in the annual report.

Rationale: The purpose of an SOW is to provide direction for the execution of a treatability study. The SOWs should be provided for each alternative selected as a site-wide treatability study at RFP. The SOWs should include all necessary information, including the information about monitoring of the experiment and analyzing input and output solutions, soils and gases.

REFERENCES

U.S. Department of Energy, 1992, Final Comment/Resolution Summary of EPA Comments on Final Treatability Studies Plan, Rocky Flats Plant.

Geosafe Corporation, 1992, In-situ Vitrification Technology Update.

In summary, PRC's review concludes that several issues should be addressed in the annual report. The basis for most of the concerns is the inconsistency between the document and its supporting materials, and the inaccuracy of information presented in tables and internal references. By addressing differences between information presented in the tables and the internal references, and the inaccuracy of the information and internal references, the overall clarity and utility of the document will be greatly improved. In addition, a discussion of the rationales for selecting or eliminating particular technologies in the final screening process would clarify the annual report. This information should also be included in the text and tables.

If you have any questions, please contact me or Lynn Davies at 295-1101.

Sincerely,

PRC Environmental Management, Inc.

Zhaoxia (Jenny) Qiu
Geochemist

ZQ/sn

cc: Lynn Davies
PRC File